Choice of vascular surgery as a specialty: Survey of vascular surgery residents, general surgery chief residents, and medical students at hospitals with vascular surgery training programs

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Purpose: **Under the direction of the Association of Program Directors in Vascular Surgery, a survey was mailed to vascular surgery residents (VSRs), general surgery chief residents (GS-CRs), and fourth-year medical students (MSs) to better define reasons why trainees do and do not choose vascular surgery as a career.**

Methods: **Questionnaires were mailed to all accredited VSR programs and their associated GS programs in the United States and Canada in 2001 (survey 1) and in 2003 (survey 2) and to 2 medical schools with VSR programs in 2001. A total of 197 VSRs, 169 GS-CRs, and 78 MSs responded (overall program response rate of 78% for VSRs, 46% for GSRs, 20% for MSs). A scoring system was assigned, with 1.0 the least important and 5.0 the most important reasons to choose or not choose vascular surgery.**

Results: **Technical aspects, role of mentors, and complex decision making involved in vascular surgery were the most important reasons that VSRs, GS-CRs, and MSs would choose vascular surgery as a specialty (average scores ≥4.0 for VSRs and GS-CRs; ≥3.5 for MSs). Responses of GS-CRs and VSRs did not vary significantly between surveys 1 and 2, except endovascular capabilities of vascular surgeons had a more important role in choosing vascular surgery, and future loss of patients to other interventionalists had a more important role in not choosing this specialty in the more recent survey of GS-CRs and VSRs. MSs identified lifestyle as a surgical resident (4.3) and as a surgeon (4.2) as the most important negative factors. A training paradigm consisting of 4 years general surgery + 2 years vascular surgery with a GS certificate was favored by 64% of GS-CRs and 48% of VSRs, compared with a paradigm of 5 years + 2 years with a general surgery certificate, which was favored by 29% of GS-CRs and 25% of VSRs, or 3 years + 3 years without a general surgery certificate, favored by 7% of GS-CRs and 27% of VSRs. Of note, 86% of MSs favored 3 years general surgery + 3 years vascular surgery or 2 years general surgery + 4 years vascular surgery compared with longer general surgery training periods.**

Conclusion: **These findings may help vascular surgery program directors devise strategies to attract future trainees. The importance of mentorship to general surgery junior residents and medical students in choosing vascular surgery cannot be overestimated. Endovascular capabilities of vascular surgeons have an increasingly positive role in career choice by GS-CRs and VSRs, but these residents express increasing concerns about potential loss of patients to other specialists. Lifestyle concerns are the most important reasons why medical students do not choose vascular surgery as a career. (J Vasc Surg 2004;40:978-84.)**

Members of the Association of Program Directors in Vascular Surgery (APDVS) were concerned that the number and possibly the quality of applicants to vascular surgery residency programs had decreased in recent years. We previously suggested strategies to improve outpatient education for residents and medical students on a vascular surgery service, because of our concern about this issue.[1] Possible reasons suggested for the decreasing number of applicants to vascular surgery training programs include lifestyle, poor mentorship, financial considerations, and a diminishing applicant pool for general surgery residencies.[2-7] Of substantial concern is a decreasing interest in vascular surgery residency by finishing general surgery residents. The pool of US-trained medical students vying for positions in vascular surgery has decreased substantially.[2,3,8] Since 1997 the number of training positions available in vascular surgery programs accredited by the Accreditation Council for Graduate Medical Education has increased by 34% (82 in 1997 to 110 in 2004 for the vascular surgery residency match), but the total number of active applicants to these programs decreased by 21% (126 in 1997 to 100 in 2004).[8] The number of vascular applicants with US medical degrees decreased by 36% (107 in 1997 to 68 in 2004) during this time.[8] Only 68 US medical graduates were available for 110 vascular surgery residency positions in 2004.

Previous surveys addressing different vascular issues have proved helpful in providing pertinent information regarding vascular training and experience.[9] Under the

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direction of the APDVS, a survey was mailed to vascular surgery residents (VSRs), general surgery chief residents (GS-CRs), and fourth-year medical students (MSs) to better define reasons why they do or do not choose vascular surgery as a career. These factors may inform the APDVS to devise new strategies to attract high-quality applicants.

METHODS

A survey listing reasons for choosing vascular surgery as a career was mailed to the directors of all vascular surgery residency programs accredited by the Accreditation Council for Graduate Medical Education and their respective general surgery programs in the United States and Canada in 2001 (survey 1, 81 programs) and 2003 (survey 2, 93 programs). These surveys were then forwarded by the program directors to VSRs and GS-CRs. Surveys were mailed to directors of medical education at 10 US medical schools with vascular surgery residency programs in 2001; these surveys were then forwarded to medical students. Factors were listed as reasons to choose or not choose vascular surgery as a career on the basis of informal pilot discussions with VSRs, GS-CRs and MSs and by reviewing other pertinent questionnaires.[2]

Responses were scored with 2 different methods. Both methods were based on scores ranging from 1 to 5, where 5 was the most important reason and 1 was the least important reason why vascular surgery was or was not chosen as a specialty. One scoring system used a weighted average of each set of responses to yield a score ranging from 1.0 to 5.0. For example, if half of the trainees chose 5 and the other half of trainees chose 1 for importance of a particular reason, a score of 2.5 was assigned. The second scoring system enabled binary analysis with scores 1 and 2 combined as unimportant reasons and 4 and 5 combined as important reasons why vascular surgery was or was not chosen as a specialty. For example, a particular reason may have been considered important by 60% of trainees (those who answered 4 or 5) and unimportant by 30% of trainees (those who answered 1 or 2), implying that 10% of trainees chose 3. Questions relating to training paradigms and practice patterns were also included in the questionnaires.

Survey responses were received from 53% (43 of 81) of the general surgery programs in 2001, with 101 GS-CRs responding (15 chose vascular surgery, 86 did not) and from 40% (37 of 93) of the general surgery programs in 2003, with 68 GS-CRs responding (18 chose vascular surgery, 50 did not; Table I). We should note that this represents a low response rate of the estimated total number of chief residents in these vascular surgery programs. In the United States there are approximately 1000 GS-CRs in 252 programs, for an average of about 4 chief residents per program. The final response rate for the GS-CRs in this survey was therefore estimated to be only 31% (101 actual responders of 324 potential responders) in the 2001 survey, and 18% (68 actual responders of 372 potential responders) in the 2003 survey. Survey responses were received from 91% (74 of 81) of the vascular surgery programs in 2001, with 104 VSRs responding, and from 66% (61 of 93) of the programs in 2003, with 93 VSRs responding (Table II). The final response rate for the VSRs in this survey was therefore 82% (104 actual responders of 127 potential responders) in the 2001 survey and 57% (93 actual responders of 162 potential responders) in the 2003 survey.

Only 2 of the 10 medical schools responded to the survey (51 students from the University of Pennsylvania (Philadelphia) and 27 students from the University of Florida (Gainesville), for a total of 78 students (Table III). The number of MSs included in this survey represents a small fraction of the total number of MSs in the United States (approximately 60,000). and therefore should not be considered representative of the MS population overall.

RESULTS

The 3 most important reasons why VSRs and GS-CRs chose vascular surgery as a specialty were technical aspects, the influence of mentors, and the complex decision making involved in vascular surgery (Tables I and II). The most important reasons why GS-CRs and VSRs chose vascular surgery did not significantly vary between surveys 1 and 2, except that endovascular interventions were more important in choosing vascular surgery in the more recent survey. In the 2001 survey 40% of GS-CRs ranked endovascular interventions as an important reason for choosing vascular surgery, with an overall score of 3.6, compared with 78% and 4.1, respectively, in 2003. Endovascular interventions were listed as an important reason for choosing vascular surgery by 66% of VSRs, with an overall score of 3.7 in 2001, compared with 88% and 4.2, respectively, in 2003. Reasons why vascular surgery was not chosen as a career varied among the 3 levels of trainees. VSRs believed that surgical residents and MSs did not choose vascular surgery primarily because vascular operations are too long or stressful (Table II). It is interesting that almost half (49%) of VSRs in the second survey were concerned about future loss of patients to other interventionalists, compared with 26% in the 2001 survey. Similarly, concern about future loss of patients increased from 16% in the 2001 survey to 50% in the 2003 survey of GS-CRs. A training paradigm consisting of 4 years of general surgery + 2 years of vascular surgery with a GS certificate was the favorite choice of GS-CRs and VSRs. Most GS-CRs (64%, 27 of 42) and approximately half of VSRs (48%; 43 of 90) favored this training schedule. A paradigm consisting of 5 years general surgery + 2 years of vascular surgery with a general surgery certificate was favored by 29% (12 of 42) of GS-CRs and 24% (22 of 90) of VSRs. A paradigm of 3 years of general surgery + 3 years of vascular surgery without a general surgery certificate was favored by only 7% (3 of 42) of GS-CRs and 28% (25 of 90) of VSRs. Two questions were posed to VSRs that addressed practice patterns and the importance of a general surgery certificate. Most VSRs (70%, 73 of 104) in the 2001 survey; 75%, 62 of 82 in the 2003 survey) responded that the certificate was important, and few VSRs (14%, 15 of 104 in the 2001 survey; 15%, 12 of 82 in the 2003 survey) answered that it was unimportant.

Table I. Questionnaire Results for General Surgery Chief Residents

If you chose vascular surgery as a career, please provide reasons vascular surgery was chosen:	*Important*		*Unimportant*		*Avg. score*	
	2001	*2003*	*2001*	*2003*	*2001*	*2003*
Technical aspects of vascular surgery	100% (15/15)	100% (18/18)	0% (0/15)	0% (0/18)	5.0	4.7
Positive influence of mentors	100% (15/15)	94% (17/18)	0% (0/15)	0% (0/18)	4.9	4.6
Complex decision making involved in vascular surgery	100% (15/15)	88% (16/18)	0% (0/15)	0% (0/18)	4.7	4.3
Academic nature of vascular surgery	80% (12/15)	78% (14/18)	0% (0/15)	12% (2/18)	4.2	3.8
Better job opportunities than if a general surgeon	60% (9/15)	78% (14/18)	33% (5/15)	12% (2/18)	3.5	4.0
Endovascular capabilities of vascular surgery	40% (6/15)	78% (14/18)	0% (0/15)	6% (1/18)	3.6	4.1
Higher income than a general surgeon	13% (2/15)	45% (8/18)	47% (7/15)	34% (6/18)	2.4	3.1
If you did not choose vascular surgery as a career, provide reasons vascular surgery was not chosen:						
	Important		Unimportant		Avg. score	
	2001	2003	2001	2003	2001	2003
Liked vascular but simply preferred a different specialty	72% (62/86)	56% (28/50)	17% (15/86)	22% (11/50)	3.8	3.6
Vascular patients "too sick" - multiple medical morbidities	45% (39/86)	37% (19/50)	34% (30/86)	28% (18/50)	3.0	3.0
Lifestyle	24% (21/86)	20% (10/50)	53% (46/86)	52% (27/50)	2.8	2.4
Vascular operations: too much hemodialysis access surgery	22% (19/86)	14% (7/50)	64% (55/86)	68% (34/50)	2.1	2.1
Liked vascular but did not get favorable experience until senior resident — too late to decide	17% (15/86)	14% (7/50)	72% (62/86)	72% (36/50)	2.0	2.2
Future loss of traditional operative and endovascular cases	16% (14/86)	50% (25/50)	66% (57/86)	34% (17/50)	2.1	3.1
Vascular operations: too many endovascular cases	15% (12/86)	28% (24/50)	74% (64/86)	48% (24/50)	1.9	2.6
Vascular operations: too long/stressful	14% (12/86)	6% (3/50)	74% (64/86)	80% (40/50)	1.9	1.7
Vascular operations: too many urgent/emergent cases	12% (10/86)	20% (10/50)	71% (61/86)	60% (31/50)	1.9	2.2
Negative influence of potential mentors	12% (10/86)	12% (6/50)	76% (65/86)	78% (39/50)	1.7	1.8
Financial considerations (too much debt, underpaid)	7% (6/86)	4% (2/50)	86% (74/86)	80% (40/50)	1.4	1.6
Vascular operations: did not like technical aspects	6% (5/86)	6% (3/50)	87% (75/86)	84% (42/50)	1.4	1.2
Length of training too long	5% (4/86)	6% (3/50)	84% (72/86)	80% (40/50)	1.5	1.7

Based on scores 1-5: "not important" (1 and 2) + "important" (4 and 5) may not total 100% because some trainees circled 3.

Table II. Questionnaire Results for Vascular Surgery Fellows

Reasons vascular surgery was chosen as a career	*Important*		*Unimportant*		*Avg. score*	
	2001	*2003*	*2001*	*2003*	*2001*	*2003*
Technical aspects of vascular surgery	100% (104/104)	97% (90/93)	0% (0/104)	0% (0/93)	4.8	4.7
Positive influence of mentors	87% (90/104)	83% (77/93)	5% (5/104)	4% (4/93)	4.3	4.2
Complex decision making involved in vascular surgery	83% (86/104)	80% (74/93)	2% (2/104)	9% (9/93)	.2	3.9
Endovascular capabilities of vascular surgery	66% (69/104)	88% (81/93)	16% (17/104)	3% (3/93)	3.7	4.2
Academic nature of vascular surgery	60% (62/104)	47% (44/93)	10% (10/104)	20% (18/93)	3.6	2.9
Better job opportunities than if just a general surgeon	50% (52/104)	56% (52/93)	23% (24/104)	17% (16/93)	3.3	3.5
Higher income than if just a general surgeon	29% (30/104)	38% (35/93)	38% (40/104)	26% (34/93)	2.8	2.9
Reasons peers did not choose vascular surgery as a career						
	2003	2001	2003	2001	2003	2001
Vascular operations can be too long/stressful	68% (69/102)	82% (72/88)	15% (15/102)	10% (9/88)	3.7	4.1
Liked vascular but simply preferred a different specialty	36% (37/102)	34% (29/88)	21% (22/102)	20% (17/88)	3.2	3.1
Future loss of traditional operative and endovascular cases to cardiologists and radiologists	26% (26/101)	49% (43/88)	44% (44/101)	34% (30/88)	2.7	3.1
Too much hemodialysis access surgery	21% (21/102)	23% (20/88)	53% (54/102)	43% (38/88)	2.5	2.7
Negative influence of potential mentors	15% (15/101)	29% (25/88)	49% (49/101)	41% (35/88)	2.5	2.8
Financial considerations (too much debt)	10% (10/101)	22% (19/88)	51% (52/101)	44% (38/88)	2.4	2.7

Based on scores 1–5: "not important" (1 and 2) + "important" (4 and 5) may not total 100% because some trainees circled 3. (Not all trainees answered all questions accounting for different denominators)

Approximately half of VSRs (48%, 49 of 102 in the 2001 survey; 50%, 45 of 90 in the 2003 survey) expected they would devote their entire practice to vascular surgery, and the other half expected they would devote up to but not more than 50% of their practice to general surgery.

The opinion gathered from MSs carries less weight than those from VSRs and GS-CRs, because the response rate of MSs was low. MSs graded technical aspects and role of mentors, including the quality of the vascular surgery rotation, as the most important reasons to choose vascular surgery, but also listed the positive value of endovascular capabilities (Table III). MSs identified lifestyle as a surgical resident and as a surgeon as the most important negative factors (Table III). The next most important reasons not to choose vascular surgery were the negative effect of mentors and the length of training. Most MSs (86%) favored 3 years of general surgery + 3 years of vascular surgery (45%, 22 of 49) or 2 years of general surgery + 4 years of vascular surgery (41%, 20 of 49) without a general surgery certificate, compared with longer general surgery training periods with a general surgery certificate, 5 years of general surgery + 1 to 2 years of vascular surgery (4%, 2/49) or 4 years of general surgery + 2 years of vascular surgery (10%, 5 of 49). We wish to reemphasize that the results of the MS survey must be considered in light of the small number of responses compared with the total number of MSs in the United States.

DISCUSSION

Lifestyle, effect of role models, and other issues have been reported as critical reasons why trainees do and do not choose certain specialties.[2,4,6] In the late 1980s Schwartz et al[4] reported that MSs with academic standing in the top 15% were selecting specialties with "controllable lifestyles," namely, emergency medicine, dermatology, anesthesiology, radiology, neurology, ophthalmology, pathology, and psychiatry, and that these top students were showing a declining interest in general surgery and some of the surgical specialties. Indeed, the percentage of senior MSs that chose general surgery decreased to 6% in the 2001 match.[2] However, certain surgical fields, such as orthopedics, urology, otolaryngology, and neurosurgery, have sustained interest and showed an overall increase in students desiring training positions since 1978.[2,10] In this report we attempted to determine why trainees at different levels would or would not choose vascular surgery as a specialty, and we propose strategies to increase the number and quality of applicants.

Reasons to choose vascular surgery as a specialty. Technical aspects, positive influence of mentors, and complex decision making involved in vascular surgery were the 3 most important reasons why VSRs and GS-CRs would choose this specialty as a career.

The fine, precise techniques and advanced surgical skills required in vascular surgery are clearly an appealing aspect of this specialty. Exposing junior residents and MSs to complicated vascular operations, and allowing them to actually perform all or some of the more straightforward procedures, such as hemodialysis access, might stimulate early interest and generate enthusiasm for vascular surgery.

Our and other surveys demonstrate the positive influence of vascular surgeons serving as role models during patient interactions involving students and residents. Mentors stimulate junior residents and MSs to emulate them because of admiration for their skills and behavior. We can become better mentors by exhibiting enthusiasm and passion for our specialty by teaching and supporting academic endeavors. Demonstrating a compassionate manner toward patients and allowing junior residents and students to evaluate new patients independently appear to be critical factors in attracting trainees to vascular surgery.[1,11,12] We invite the vascular resident and the vascular team to our homes for different occasions throughout the year, which enables them to realize that vascular surgeons have lives outside of medicine that are equally as or more important than their professional careers. Limiting negative comments about adverse factors that affect our specialty, such as malpractice issues, decreasing reimbursements, and the threat of loss of our practice to other specialists, may be as important as positive feedback.

The type of patient problems that trainees encounter may have the greatest influence on their career choices.[1,2] This finding is in agreement with the current survey in which VSRs and GS-CRs ranked highly the complex decision making involved in treating vascular disease. The importance of involving trainees in the complex clinical and operative decision-making process to treat vascular disease cannot be overemphasized. Allowing junior residents and students to be the first persons to evaluate patients and instructing them to write daily progress notes on hospitalized patients with frequent presentation during rounds are examples of how to involve them in the decision-making process. Asking them to interpret imaging studies such as computed tomography scans and arteriograms are other examples.

The opportunity to obtain endovascular skills rose in importance in the more recent survey of GS-CRs and VSRs. Exposing junior residents and students to newer minimally invasive procedures, such as endovascular aortic grafts and carotid, renal, and peripheral angioplasty and stenting, and allowing them to participate, will likely prove helpful in stimulating junior trainee interest in vascular surgery. Although many of the complicated endovascular procedures are too technically demanding to allow junior trainees to be directly involved, allowing them to simply inflate the balloon during a balloon angioplasty may stimulate interest.

Interpretation of the MS responses is limited by the small number of responses compared with the overall number of MSs in the United States. Nonetheless, in our small sample 3 of the top 4 reasons why MSs would choose vascular surgery were the same reasons that the VSRs and GS-CRs gave, namely, technical aspects, positive influence of mentors, and complex decision making involved in vascular surgery. In the current survey MSs ranked the quality of a vascular rotation highly as a reason why vascular surgery was appealing as a career, and this further emphasizes the

importance of mentorship during the students' surgical rotation.[1-2] Polk[13] suggests that decreased time devoted by surgical faculty to serve as role models for MSs in the wake of decreasing reimbursements, shorter hospital stays, and lack of disposable time accounts for the decreasing number of students choosing surgical careers. Endovascular capabilities also ranked highly as a reason why MSs would choose vascular surgery.

Reasons not to choose vascular surgery as a specialty. The most commonly listed reason why GS-CRs did not choose vascular surgery as a career was simply preference of an alternative specialty, not because of any particular negative aspects of vascular surgery. Junior residents and MSs may be attracted to different career choices because of exposure to other specialties earlier in their training. There may even be a bias before medical school that certain specialties are more appealing and glamorous compared with others, possibly because of positive public perception of some specialties or lack of public knowledge of vascular surgery as a specialty.

Our survey demonstrated that future loss of patients to other interventionalists is becoming an increasing concern among VSRs and GS-CRs. Although there may not be much that vascular surgeons can do to prevent cardiologists or radiologists from increasingly performing vascular interventions, vascular surgeons need to aggressively develop strategies to maintain their role as the primary specialist for patients with vascular disease.

All of the reasons to choose or not choose vascular surgery as a career should be considered in light of the fact that half of MSs today are women.[12] Inasmuch as few women choose general surgery as a career, this gender shift has reduced potential general surgery applicants by nearly 50%.[12] Many women believe that lifestyle of the general surgeon and duration of training are extremely difficult to balance with family life.[2] In a survey of 501 surgical residents, items that were of more concern to women than to men were availability of role models, ability to express emotion at work, maintenance of personal relationships, childbirth during residency, and postponement of family plans.[12,15]

Understanding the reasons why MSs did not find VS appealing as a career is again limited by the small number of responses to our survey. The most important reasons given were lifestyle as a general surgery resident and as a vascular surgeon; more than 90% of respondents listed these factors as important. MSs may consider lifestyle issues to be a negative factor in choosing any surgical field, regardless of specialty, and has been reported by others.[2,6,12] Three specialties with a "controllable" lifestyle, namely, radiology, anesthesiology, and emergency medicine, have all shown increasing student interest among US senior students from 1978 to 2001.[2] Just as the role of mentors was an extremely important reason why MSs would choose vascular surgery as a career, serving as a poor role model was similarly scored highly as a reason why students would not choose this specialty. Relating dissatisfaction concerning decreasing reimbursements, malpractice issues, hospital politics, and other negative aspects of work, while not spending time teaching or expressing interest in MSs, serves as a strong disincentive in influencing junior trainees toward vascular surgery. Bland and Isaacs[2] reported that that almost half (41%) of MSs reported making their decision about choice of a specialty during or after the third year of medical school. Clearly the effect that vascular surgeons can have on MSs regarding career choice can still be substantial if rotations are held during the third and fourth years. However, some medical schools have decreased the third-year surgical rotation to a total of 6 weeks, and changed the subspecialties rotation, including vascular surgery, to a fourth-year elective.[16] Indeed, at our hospital not all medical students rotate on the vascular service, and for those who do, only 2 weeks are spent on the service during the third year.

Future career plans for VSRs regarding general surgery practice. Approximately half (49%) of VSRs replied that they planned to practice only vascular surgery during their careers, and the other half (51%) answered that they planned to limit general surgery to no more than half their practice. This finding has important implications for designing training paradigms for vascular surgery. A strategy should be considered in which those trainees who expect to perform both general surgery and vascular surgery need to be adequately trained in both specialties, possibly by undergoing 4 to 5 years of general surgery training plus 1 to 2 years of vascular surgery. A different paradigm should be available to those trainees planning to perform only vascular surgery, and would require less general surgery training, such as 2 to 3 years of general surgery followed by 3 to 4 years of vascular surgery.

Choice of training paradigms. When GS-CRs and VSRs were asked which training paradigms they found most attractive, there was a clear difference in responses among trainees at different levels. These responses must be considered in light of the fact that surveys were mailed only to programs with vascular surgery training programs, which may have introduced some bias into the results. The traditional 5 years of general surgery plus 1 or 2 years of vascular surgery training (5 years of general surgery + 1 to 2 years of vascular surgery) was not favored by most VSRs or GS-CRs. The favorite paradigm for VSRs and GS-CRs was 4 years of general surgery + 2 years of vascular surgery, with an accompanying general surgery certificate. It may not be surprising that essentially three fourths of VSRs and GS-CRs who had already devoted 5 to 7 years of general surgery training favored a training paradigm consisting of more years of general surgery training with granting of a general surgery certificate, followed by vascular surgery training. This finding may not be a true reflection of training favored by younger physicians, however.

The number of MSs responding to this survey was small compared with the number of MSs in the United States, and may not reflect the opinion of a larger sample size, and thus should be given less weight than the responses of the VSRs and GS-CRs. Duration of training was listed by most MSs as an important reason why vascular surgery was not

appealing. Others have also noted this result.[2,12] Most MSs responded that they favored a paradigm consisting of fewer years in general surgery training, without general surgery certification, namely, 3 years of general surgery + 3 years of vascular surgery, or 2 years of general surgery + 4 years of vascular surgery, but we wish to reemphasize that the number of MSs responding is small, and may reflect a significant bias.

Limitations of study. Limitations of our study include self-reported data that were not independently verified. Ours was essentially a retrospective study with a small number of respondents. There may be biases in responding of which we are not aware. For example, 26% of the GS-CR respondents in this survey chose vascular surgery as a career choice, which is a much higher percentage of general surgery residents that actually choose vascular surgery as a career, and likely reflects bias of the data, because the surveys were mailed only to programs with vascular surgery training programs. Nonresponders, compared with responders, may have different opinions as to why vascular surgery was or was not chosen. The overall response rate was low, especially for the MS survey, which represented a small, selected sample size from 2 large university schools. The responses of MSs should not carry the same weight as the VSR and GS-CR responses. Indeed, the low response rate among GS-CRs may also not be indicative of opinions among the entire population of chief residents in the United States. The response rate for VSRs was in line with other surveys.[9] The results of the VSR and GS-CR surveys collected at 2 different times were remarkably similar, except for the change in perception about endovascular interventions and the threat of loss of patients to other interventionalists.

CONCLUSIONS

Our findings may serve as a benchmark as to why general surgery residents and MSs do or do not choose vascular surgery as a career, and may help APDVS program directors devise strategies to attract the best and brightest trainees. We recommend that the Society for Vascular Surgery or the APDVS establish a task force or committee to address this issue and devise these strategies. The importance of mentorship to junior residents and MSs, especially women trainees, cannot be underestimated. Having MSs rotate on a vascular surgery service for a reasonable length of time and relatively early in medical school is critical to attracting them to vascular surgery. Lifestyle concerns are the most important reasons MSs do not choose this specialty. The primary challenges for vascular surgery program directors are to improve lifestyle for trainees by decreasing duration of training and of working hours while achieving the requisite training necessary to become a well-trained vascular surgeon, and to convince trainees that life as a vascular surgeon is rewarding professionally and personally.

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DISCUSSION

Dr Julie Ann Freischlag (Baltimore, Md). As all of us know, 22% of our vascular fellowship programs did not match last week. And I think that is quite sobering, and it's really a wake-up call, because it's only gotten worse over the last few years.

Your survey, which you began a couple of years ago, demonstrates that general surgery residents really like the technical aspect of what we do, and love the endovascular capabilities that we do, and if the mentorship was right, they said vascular surgery was what they decided to do. However, if you look at those that didn't choose vascular surgery, mentorship also was the most important negative influence. First, maybe you can give us a few other ideas about how to be a better positive mentor for general surgery residents.

Second, there are the medical students. When you look at lifestyle issues, vascular patients are almost always sick, and demand a great deal of care and time to get them through their problems.

General surgery has fixed their problem. This year there were only 3 unfilled spots in the county for general surgery. And it was dismal a few years ago. So I think we can come up with some things to do to fix this quickly.

Third, there's the women issue. If you look around this room, there are not many women here. How do we solve this problem? If you look at who is in college right now, 62% of college students are women. And so for the next 10 years over half of medical students are going to be women. So what are we going to do to get them to be vascular surgeons? I think we're going to have to work hard to get them into surgery. But how are we going to get them out of general surgery and to become vascular surgeons?

So I appreciate your comments. Keith, you've been a great mentor to many students, women and men, and certainly many in this room have done a lot to try to attract people to our specialty. I actually think we're in an emergency situation, and this is the year to work on it.

Dr Keith D. Calligaro. I think the results of this year's match show that the situation is an emergency. We're facing a crisis in terms of producing reasonable numbers of vascular surgeons.

In answer to your questions, I think we need to apply similar strategies, not only for medical students and junior residents but for women also. All program directors and all of us who work with students and junior residents need to assume this as a personal responsibility. We have to show interest in junior residents and students.

In particular, a strategy that I use is to allow students or residents to evaluate new patients first and present them to you, whether as a consult in the hospital or a new patient in the clinic. This simple approach gets them interested. Students really like our rotation because they get involved in taking care of patients, and they like office hours for that reason. Also, allowing students or junior residents to do part of an operation or part of an endovascular procedure can play an important role. I don't think we should underestimate how important this can be. There may be many of you in the audience who were allowed to do a little bit of an anastomosis as a fourth-year student or junior resident, and you didn't forget it, and it greatly stimulated your interest. I would recommend the formation of a task force developed by the SVS or the APDVS to address this issue.

Dr Peter Pappas (Newark, NJ). I think the issue with the medical students is a little bit more complex than that. Depending on what medical school you're in and what part of the country you're in, you either have an 8-week or a 6-week rotation now. The days where you were exposed to general surgery for 12 weeks are very few and far between. At our institution the medical students rotate for 7 weeks on general surgery, and the last week is totally devoted to lectures. We have medical students on our service for only 1 week at a time. So the other ways to get involved with the medical students is to be involved in their core lecture series. Also, I applaud your efforts at getting them more involved with the clinic, because I think that's absolutely right on the money what needs to be done.

I think, also, in terms of the general surgery residents, one of the things that we've done is we've gone back to them in our residency program and asked them what they would like to see done differently. We have actually changed our approach a little bit. There used to be a fourth-year and a second-year resident rotation, and now we've changed to a third-year and a second-year rotation. And they enjoy it more, because they get to do that vascular anastomosis you just talked about.

The other thing is, we've also changed our conferences a little bit. They used to be directed more at the fellow, and the residents would sit in the back of the room and fall asleep. We now have the fellows, who run the conference, direct all of the questions toward the general surgery residents, and it's much more interactive. We've moved the chairs so that they're in the front of the room.

And it goes back to the whole point about mentoring. I think we failed in that regard. If you look at our general surgery residency colleagues, the Association of Academic Surgery has for years put money and effort into mentorship. And I think with the new SVS council we should make mentorship and education a top priority.

Dr Calligaro. We have also recently adopted having our fellows give a conference directly to residents and medical students, and that has been received very well.

You mentioned one of the biggest problems we face, and that's the length of time that medical students are exposed to a vascular rotation. We used to have students for at least 1 month. Now it's been cut down to 2 weeks, actually 8 days. It is difficult to convince someone to choose your specialty when you have them for such a short time. We're going to have to consider what we can do about it, whether it's going to the dean of the medical school or have the chairman of the surgery department try to help. It's going to be a difficult problem.